Prevalence of Urological Complications Associated with Sickle Cell Disease

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Background: Sickle cell disease (SCD) is characterized by sickling of red blood cells during reduced oxygen tension. This leads to intravascular hemolysis and vaso-occlusive events which subsequently cause ischemia-reperfusion damage. Genitourinary system is one of the main organ-systems affected by these sequelae.

Objective: To evaluate the prevalence of associated urological complications in SCD patients.

Design: A Retrospective Study.

Setting: Aseer Central Hospital, Abha City, Kingdom of Saudi Arabia.

Method: One hundred patients were diagnosed with SCD, 70 males and 30 females. Forty-five had associated urological complications.

Result: One hundred patients were diagnosed with SCD; 45 had associated urological complications (29 males and 16 females) were included in the study. Patient's age ranged from two months to 70 years, with a mean age of 10.8 years. Twenty-four (53.3%) patients had hematuria, 14 (31%) had priapism, 3 (6.7%) had end-stage renal disease (ESRD), and 2 (4.4%) had papillary necrosis. Seven (15.6%) SCD had other associated complications. Urological complications among SCD patients did not differ significantly according to gender.

Conclusion: Almost half of SCD patients had associated urological complications, most commonly hematuria, priapism (among males) and ESRD. Therefore, SCD patients should be regularly examined for urological complications to detect early and manage associated urological complications.

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Sickle cell disease (SCD) is a common genetic disorder that affects millions of people worldwide[1]. This disease is prevalent in people of African descent in the USA and Europe. It is prevalent in sub-Saharan Africa, India, Saudi Arabia, and in the Mediterranean countries, including Italy, Greece, and Turkey[2,3].

SCD is characterized by sickling of the red blood cells during reduced oxygen tension, which leads to intravascular hemolysis and vaso-occlusive events and subsequently cause ischemia-reperfusion damage. The genitourinary system is one of the main organ-systems affected by these sequelae[4-5]. The highly vascular nature of the kidney predisposes it to be a common victim of sickle cell damage. Since one of the most devastating effects to monitor is sickle cell-induced renal failure or sickle cell nephropathy (SCN), physicians must be familiar with the other common renal complications of SCD[2]. These complications make SCD a public health problem in many countries including Saudi Arabia[6].

Owing to the advancement in the understanding of the disease and the availability of better modalities of treatment, the life expectancy, which was approximately 14 years in the 1970s, has risen to above 50 years[7]. SCD patients are more prone to develop certain complications as they advance in age. Hence, it is important to study the various manifestations and complications of this disease in populations where it is prevalent.

The aim of this study was to evaluate the prevalence of urological complications associated with SCD.

METHOD

One hundred SCD patients who presented to the hospital from 2011 to 2015 were reviewed. Forty-five patients who had associated urological complications were included in the study. Patients with a history of an investigational drug or procedure within one month of their presentation to the hospital were excluded.

Data were coded and analyzed using the SPSS version 20. Descriptive statistics, such as frequency, percentages, range and mean, were calculated. Chi-square test was applied. P-values less than 0.05 were considered as statistically significant.

Ethical Principles for Medical Research Involving Human Subjects guidelines were adhered to while performing this study.

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RESULT

One hundred SCD patients presented to the hospital from 2011 to 2015 (70 males and 30 females). Their age ranged from two months to 70 years, with a mean age of 10.8 years. Out of the 100 patients of SCD, 45 (45%) had associated urological complications, 29 males and 16 females, see figure 1.

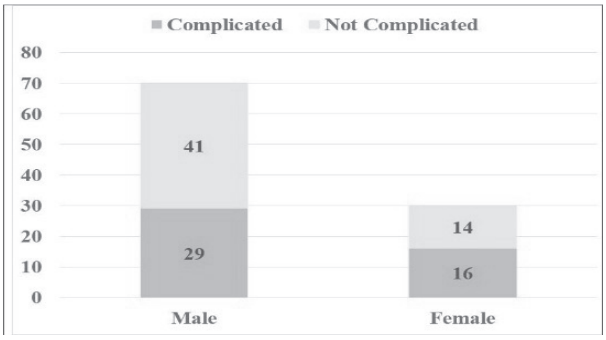

Figure 1: Associated Urological Complications in SCD Patients According to Gender

Table 1 shows that 24 (53.3%) had hematuria, 14 (31%) had priapism, 3 (6.7%) had end-stage renal disease (ESRD) and 2 (4.4%) had papillary necrosis. Seven (15.6%) SCD cases had other associated complications, such as proteinuria, urinary concentration defect, renal tubular acidosis and medullary carcinoma. Urological complications among SCD patients did not differ significantly according to gender.

Table 1: Associated Urological Complications in SCD Patients According to Gender

	Male (n=29)	Female (n=16)	**Total (n=45)**	**P** Value
Urological Complications	No. (%)	No. (%)	**No. (%)**	
Hematuria	15 (51.7%)	9 (20.0%)	**24 (53.3%)**	0.18
Priapism	9 (31.0%)	-	**9 (20%)**	-
End stage renal disease	1 (3.4%)	2 (12.5%)	**3 (6.7%)**	0.36
Papillary Necrosis	0 (0.0)	2 (12.5%)	**2 (4.4%)**	0.07
Others	4 (13.8%)	3 (18.8%)	**7 (15.6%)**	0.35

DISCUSSION

Forty-five of one hundred SCD cases had associated urological complications, which was significantly more among females than males (60% and 38.6%, respectively, p=0.048). Hematuria was the most common manifestation affecting more than half of the patients with urological manifestations. Priapism was also high among male SCD patients (33%). Moreover, 6.7% cases had end-stage renal disease (ESRD), while two 4.4% had renal papillary necrosis; in addition, 15.6% of cases had other associated complications. Hariri et al found that hematuria is microscopic or macroscopic and considered one of the most common manifestations of SCD[8].

Alhwiesh stated that hematuria occurs due to polymerization of RBCs within the renal medulla[6]. Most incidents of hematuria among SCD are quite limited. They may occur as a result of a small infarction in the renal pyramids, which might be associated with renal papillary necrosis[9]. Kaze et al added that higher prevalence of hematuria among SCD cases is present among males. It is usually painless and self-limited[10]. However, when hematuria occurs due to diffuse papillary necrosis, it may be associated with flank or abdominal pain along with fever and vomiting. Such patients may also have severe anemia[11].

Other causes of hematuria, such as stones or lower urinary tract tumors should be considered in patients with SCD. Therefore, initial testing of SCD cases should include several investigations, including urine analysis, culture and cytology, coagulation studies, and renal ultrasound and/or renal CT scan. If sustained gross hematuria is present, cystoscopy with ureteroscopy may be required[12].

Adeyoju et al found that 40% of male SCD patients had priapism[13]. Akinbami et al found that priapism in SCD occurs due to the impeded free blood flow by sickle RBCs in affected vessels, causing obstruction, congestion, hypoxia, and lactic acidosis[14]. A treatment plan can be started with repeated intra-cavernosal injections of phenylephrine (every 5 minutes) till detumescence[15].

Pham et al found that in cases of SCD, the hypoxic, acidotic, and hyperosmolar environment of the inner medulla promotes RBCs sickling, leading to impairment in renal medullary blood flow, ischemia, microinfarction and renal papillary necrosis[16].

Henderickx et al found that in patients with SCD renal papillary necrosis has an incidence of up to 50%. It presents mainly between the 3rd and the 4th decades. Since it is not commonly seen in daily practice, it is important to consider it in patients with SCD presenting with hematuria. In adults, it is mainly diagnosed by contrast-enhanced CT. However, in children, it is diagnosed by retrograde pyelography and the characteristic radiologic signs[17].

In this study, the complication findings associated with SCD especially ESRD is similar to McClellan et al who found that 6.8% of SCD patients had ESRD[18]. However, it is less than that reported by Alkhunaizi et al who found that 1.17% of SCD patients developed ESRD. They found that SCD patients in the eastern region have less severe SCD due to the presence of the Asian b-globin haplotype, compared with patients in the southwestern region, who have the Benin haplotype.

CONCLUSION

Almost half of the SCD patients in southwestern region of Saudi Arabia have associated urological complications, most commonly hematuria, priapism and ESRD. Therefore, SCD patients should be regularly examined for urological complications to early detect and manage any associated urological complications.

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